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The right to food

Seed policies and the right to food: enhancing agrobiodiversity and encouraging innovation

Note by the Secretary-General

The Secretary-General has the honour to transmit to the members of the General Assembly the interim report of the Special Rapporteur on the right to food, Olivier De Schutter, submitted in accordance with paragraph 36 of General Assembly resolution 63/187.

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Report of the Special Rapporteur on the right to food

Summary

The professionalization of breeding and its separation from farming leads to the emergence of a commercial seed system, alongside the farmers' seed systems through which farmers traditionally save, exchange and sell seeds, often informally. This shift has led to grant temporary monopoly privileges to plant breeders and patent-holders through the tools of intellectual property, as a means to encourage research and innovation in plant breeding. In this process, however, the poorest farmers may become increasingly dependent on expensive inputs, creating the risk of indebtedness in the face of unstable incomes. Private-led research may seek to satisfy the needs of farmers in industrialized countries, while neglecting those of poor farmers in developing countries. The farmers' seed systems may be put in jeopardy, although most farmers in developing countries still rely on such systems, which, for them, are a source of economic independence and resilience in the face of threats such as pests, diseases or climate change. Finally, agrobiodiversity may be threatened by the uniformization encouraged by the spread of commercial varieties.

The present report explores how States could implement seed policies that contribute to the full realization of human rights. It identifies how research and development could best serve the poorest farmers in developing countries, and how commercial seed systems could be regulated to serve the right to food and ensure the right of all to enjoy the benefits of scientific progress. Finally, it examines how farmers' seed systems could be best supported, in order to serve the interest of all in the preservation of agrobiodiversity.

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I. Introduction

1. The present report[1] examines the impact of seed policies and intellectual property rights in agriculture on the realization of the right to adequate food.[2] It seeks to provide guidance to States as to how to implement seed policies that fully take into account both the need to favour innovation in agriculture and to ensure that the kind of innovation which is promoted contributes to the full realization of the right to food. It is the result of a large number of consultations held with farmers' organizations, the secretariats of the World Intellectual Property Organization (WIPO), of the International Union for the Protection of New Varieties of Plants (UPOV), of the International Treaty on Plant Genetic Resources for Food and Agriculture within the Food and Agriculture Organization of the United Nations (FAO), and of Bioversity International, and various non-governmental organizations, as well as a number of academic experts.[3] In 2008, the International Assessment of Agricultural Knowledge, Science and Technology for Development concluded that "[t]echnologies such as high-yielding crop varieties, agrochemicals and mechanization have primarily benefited the better resourced groups in society and transnational corporations, rather than the most vulnerable ones. To ensure that technology supports development and sustainability goals, strong policy and institutional arrangements are needed ...". Just like research and development in agriculture in general, seed policies must be guided, not by a preconceived view about the benefits technology can bring to farming, but by a careful examination of their impacts on food security and, specifically, on the ability of the most vulnerable farmers to improve their livelihoods.

2. The development of a commercial breeding sector separate from farming and, more recently, of a biotechnological sector, has led to increased demands for the protection of the rights of breeders and inventors of biotechnologies, demands which now have penetrated at the global level. The shift from agricultural research as a public good providing farmers with seeds incorporating advanced traits to the granting of temporary monopoly privileges to plant breeders and patent-holders through the tools of intellectual property is essentially defended as a means to reward, and thus incentivize, research and innovation in plant breeding. But it may also create challenges for States, which this report documents in section III.

3. A human rights framework may assist States in addressing these challenges. This framework obliges us to ask not only which policies may maximize yields — agricultural outputs — but also, and primarily, who will benefit from any increases achieved by whichever policies are put in place. The right to food requires that we place the needs of the most marginalized groups, including in particular smallholders in developing countries, at the centre of our efforts.

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[1] This report is based on the longer version, containing the references, prepared by the Special Rapporteur and available from the website http://www.ohchr.org.

[2] The report does not discuss the impact of intellectual property rights on the raising of livestock or on fishing, although similar issues — concerning the access of herders and fishers to productive resources — may arise in these areas. Nor does the report discuss the specific questions raised by genetically modified organisms in agriculture, since research on the impacts on the right to food is still ongoing.

[3] The contributions received from these experts have greatly enriched the information on which this report is based. A set of contributions prepared by these experts for the mandate and coordinated by S. Dusollier is available from www.srfood.org; it will be referred to as the "experts' submission" in the remainder of this report.

4. Article 11 of the International Covenant on Economic, Social and Cultural Rights imposes on States three levels of obligations in the realization of the right to food. First, States have an obligation to respect existing access to adequate food. This requires that States do not take any measures that result in preventing such access (see E/C.12/1999/5, para. 19). The introduction of legislation or other measures which create obstacles to the reliance of farmers on informal seed systems may violate this obligation, since it would deprive farmers from a means of achieving their livelihood: Guideline 8.1 of the FAO Voluntary Guidelines to Support the Progressive Realization of the Right to Adequate Food in the Context of National Food Security[4] provides that States should "protect the assets that are important for people's livelihoods".

5. Second, States have an obligation to protect the right to food: this obligation would be violated if a State failed to regulate the activities of patent-holders or of plant breeders, so as to prevent them from violating the right to food of the farmers depending on those inputs in order to be able to continue to farm (see E/C.12/1999/5, para. 19; and Guideline 8.5 of the FAO Voluntary Guidelines). Thus, the Committee has recommended that India provide "State subsidies to enable farmers to purchase generic seeds which they are able to reuse, with a view to eliminating their dependency on multinational corporations" (E/C.12/IND/CO/5, para. 69).

6. Finally, States have an obligation to fulfil the right to food. They must facilitate it by proactively strengthening people's access to and utilization of resources and means to ensure their livelihood, including food security (E/C.12/1999/5, para. 15); they must also "improve methods of production [...] of food by making full use of technical and scientific knowledge", according to article 11 (2) (a), of the International Covenant on Economic, Social and Cultural Rights and Guideline 8.4.

7. These obligations apply both to the regulation of commercial seed systems and to the preservation and enhancement of informal or traditional farmers' seed systems. The separation of seed production and improvement from farming and the emergence of biotechnologies has led to a commercial seed system on which farmers are increasingly dependent. That system therefore has to be regulated in order to ensure that farmers have access to inputs on conditions which are reasonable, thus helping them to achieve an adequate standard of living; and they should ensure that the innovations leading to improved varieties and to new plant resources benefit all farmers, including the most vulnerable and marginalized among them. This follows both from article 11 (2) (a), of the International Covenant, cited above, and from the right of everyone to enjoy the benefits of scientific progress and its applications, recognized in article 15 (1) (b), of the Covenant, which could be relied upon in order to justify recognizing a right of access of farmers to seeds which are not in open access. But States also should ensure that informal, non-commercial seed systems can develop: they should not interfere with such systems without adequate justification; they should protect such systems from interference by third parties; and they should proactively ensure that these systems can expand, despite the pressure imposed by the commercial seed system. Only a balanced approach between these two sets of obligations will ensure that the farmers will be in a position to make a fully free and informed choice between these systems, which are alternative ways for them to pursue their livelihoods.

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[4] FAO, *Report of the Council of the Food and Agriculture Organization of the United Nations, One Hundred and Twenty-seventh Session, Rome, 22-27 November 2004* (CL 127/REP), appendix D; see also E/CN.4/2005/131, annex.

8. In seeking to assist States in taking into account human rights in the implementation of their seed policies, the present report therefore underlines the obligation of States to use to the fullest extent required by human rights the flexibilities included in the international agreements related to intellectual property rights, consistent with the obligation to protect the right of everyone to enjoy the benefits of scientific progress and its applications, and the right to food, including access to productive resources. But account is also taken of the urgent need to support traditional knowledge, innovations and practices, as a source of adaptation of local communities to new threats such as climate change, soil erosion or outbreaks of new crop diseases.

9. Section II of this report describes the existing international legal framework and the different regimes which relate to intellectual property rights and biodiversity protection. Section III describes the challenges faced by States and identifies which measures States could take in order to ensure that their seed policies contribute to the realization of the right to food. Section IV summarizes the conclusions and recommendations.

II. The developing regime of intellectual property rights and biodiversity protection

10. Domestic legislation and policies in this area are increasingly influenced by the changing framework of international law. We have witnessed in recent years an important strengthening of intellectual property rights at the global level, at the request of developed countries and for the benefit of companies from these countries. At the same time, efforts are made to reaffirm the sovereignty of States over their genetic resources, as a means to reward the contributions States and communities make to preserving biodiversity. Even more recently, the importance to food security of the accessibility of plant genetic resources for food and agriculture has been recognized, and an ambitious multilateral system for access and benefit-sharing has been put in place in order to reconcile the needs of innovation and the protection of crop genetic diversity.

A. The expansion of intellectual property rights

11. The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) requires from members of the World Trade Organization (WTO) that a minimum patent protection of 20 years be available for all inventions, whether of products or processes, in almost all fields of technology. Protection is optional for plants and animals (other than micro-organisms), as well as for essentially biological processes used in the production of plants or animals (other than microbiological processes). However, members of WTO must provide for the protection of plant varieties either by patents, by an effective sui generis system or by any combination thereof (article 27 (3) (b)).

12. Patents provide the right-holder with a 20-year monopoly on any use of the patented invention. They may apply to seeds, plant cells or DNA sequence. The importance of patents in plants has grown with the recent rise of agricultural biotechnology, particularly of transgenic crops which have been commercialized since 1996. Farmers cultivating patented seeds do not have any rights over the seeds

they plant. They are considered to be licensees of a patented product, and they frequently are requested to sign agreements not to save, resow or exchange the seeds which they buy from patent-holders. Patents are the most far-reaching form of protection that can be granted.

13. Plant varieties may be protected, alternatively, by the recognition of plant breeders' rights. The International Convention for the Protection of New Varieties of Plants, developed under the auspices of UPOV, currently has 67 member States, including all large commercial powers with the notable exception of India.[5] It protects the rights of plant breeders provided they develop plant varieties which are new, distinct, uniform and stable (article 5 (1)). These criteria are lower than for the delivery of patents. Because of its requirement of uniformity and stability, however, the UPOV Convention does not allow the protection of farmers' varieties, which are inherently unstable and in permanent evolution.

14. The 1991 version of the UPOV Convention contains a number of flexibilities. But it also strengthens the protection of original plant breeders' rights in comparison to previous versions: it extends the duration of the protection from a minimum of 15 years to a minimum of 20 years (from 20 to 25 years for vines and trees); it prohibits not only the production for the purposes of commercial marketing, and the sale and marketing of propagating material of the variety, but also "production or reproduction; conditioning for the purpose of propagation; offering for sale; selling or other marketing; exporting; importing; and stocking for the above purposes", without the authorization of the breeder (article 14 (1)); these prohibitions extend beyond the reproductive or vegetative propagating material, to the harvested material obtained through the illegitimate use of propagating material (article 14 (2)) and so-called "essentially derived" varieties (article 14 (5)); finally, it restricts the so-called "farmer's privilege" by removing the possibility for States to allow farmers to exchange or sell seeds saved from the harvest of protected varieties: article 15 of the 1991 UPOV Convention only allows restricting breeders' rights "in order to permit farmers to use for propagating purposes, *on their own holdings*, the product of the harvest which they have obtained by planting (...) the protected variety" (emphasis added).

15. Members of WTO who wish neither to grant patents on plant varieties nor to grant plant variety protection under the UPOV Convention may opt for a sui generis form of protection, best suited to their specific circumstances. In particular, if they feel that the farmers' privilege is unduly restricted under the 1991 version of the UPOV Convention, they may wish to establish a sui generis protection for plant varieties allowing them to preserve the well-established practices of saving, sharing and replanting seeds, as well as the equally traditional practices of local farming communities to conserve and sustainably use biological diversity, including through the selection and breeding of plant varieties.[6]

16. Nevertheless, in practice, most countries have been led to adopt UPOV-compliant domestic legislation. This may be the result of technical advice provided to developing countries, which often consists of recommending the adoption of UPOV-compliant domestic legislation, without taking into account the specific

[5] Most States are parties to the most recent version, 1991, of the UPOV Convention. However, Brazil, Canada, China and South Africa are parties to the 1978 version of the Convention.

[6] Commission on Intellectual Property Rights (United Kingdom of Great Britain and Northern Ireland), *Integrating Intellectual Property Rights and Development Policy*, 2002, chap. 3.

needs of the countries concerned or, for instance, differentiating between crops. A number of developing countries have also been pressured to adopt national legislation that is in compliance with the 1991 version of the UPOV Convention, as part of trade agreements they have concluded. Some free trade agreements require the introduction of patent protection for plants, animals and biotechnological innovations. Others refer to the need for both parties to ratify the 1991 UPOV Convention, or to adopt legislation complying with that instrument.

17. Initiatives have been developing to resist this trend. The African Union has developed an African Model Law for the Protection of the Rights of Local Communities, Farmers and Breeders, and for the Regulation of Access to Biological Resources, which aims to achieve a balance between the protection of breeders and the preservation of local farmers' rights in the interest of the sustainable use of biodiversity. When India enacted the Protection of Plant Varieties and Farmers Rights Act in 2001, it sought to protect plant varieties, while at the same time enabling farmers to save, resow, exchange and sell new plant varieties developed by farmers and breeders.

B. The protection of biodiversity and the risk of misappropriation of genetic resources

18. One of the concerns raised by the extension of the TRIPS minimum standards to life forms is that the patentability of plants or animals could encourage the appropriation of genetic resources without the consent of, or without adequate sharing of the benefits with, the farmers and communities which have developed those resources in the first place. In 1992, the Convention on Biological Diversity was concluded in part to avert that risk, with the aim of ensuring the conservation of biological diversity and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources (article 1). It has now achieved almost universal ratification with 191 States parties, with the notable exceptions of Somalia and the United States of America. The Convention requires each Party to adopt a number of measures to maintain biological diversity, including in situ and ex situ conservation measures (articles 6, 7 and 8). Article 15 of the Convention, which is on access to genetic resources, implements the principle according to which each State has the sovereign right to exploit its own resources pursuant to its own environmental policies (see also article 3). The authority to determine access to genetic resources rests with the national governments (article 15 (1)), although the Parties at the same time should create conditions to facilitate access to genetic resources for environmentally sound uses by other Parties (article 15 (2)). Access to genetic resources, when granted, shall be on mutually agreed terms (article 15 (4)); it shall be subject to prior informed consent of the Party providing genetic resources (article 15 (5)) and on the basis of benefit-sharing (article 15 (7)).

19. The implementation of the Convention on Biological Diversity remains controversial on a number of points, including its relationship to the TRIPS Agreement.[7] It is generally agreed that, in order to ensure that the intellectual property regime they adopt will not be in violation of the Convention, States should

[7] The issue is part of the Doha Development Round of trade negotiations. See paragraph 19 of the Doha Ministerial Declaration (A/C.2/56/7, annex) and, for a review of the positions adopted by members of WTO within the TRIPS Council, WTO document IP/C/W/368/Rev.1 (8 February 2006).

at a minimum abstain from granting patents relating to biological materials which have been obtained in violation of the requirements of prior informed consent and fair and equitable benefit-sharing under the national system of the country of origin of the genetic resources, as indeed allowed under the TRIPS Agreement.[8] It would, however, be consistent with the idea of international cooperation inherent in the Convention to go beyond that, and for States to abstain from granting a patent on biological materials without requiring from those applying for the patent that they disclose where the materials originate from and that they provide information about the source and how the access and benefit-sharing requirements imposed in the source country have been fulfilled. This requirement of prior disclosure would be further strengthened by amending the TRIPS Agreement in order to include such an obligation, in order to make it more explicit. This would increase confidence among bioprospectors and biodiversity-rich countries and indigenous communities.

C. Crop genetic diversity as a global public good

20. The implementation problems facing the Convention on Biological Diversity run deeper, however, than these controversies about interpretation suggest. The Convention has failed to generate sufficient benefits to fund the conservation of biodiversity. It sometimes has created insuperable obstacles to the access of both researchers and the bioindustry to genetic resources. Most importantly, the access and benefit-sharing regime introduced by the Convention, while perhaps suited to avoid the misappropriation of genetic resources for medicines, is not adequate for domesticated plant genetic resources. Numerous farmers and farming communities have been involved in creating and maintaining genetic resources. Crop traits are genetically complex, owing their characteristics to a large number of genetic resources, conserved both within and outside their places of origin.

21. Because of these characteristics, it has been concluded that domesticated plant genetic resources should be treated as a common pool, rather than as "property" of any particular State or local community. With the adoption of the International Treaty on Plant Genetic Resources for Food and Agriculture, a multilateral system was established to facilitate access to plant genetic resources for food and agriculture and to share the benefits in a fair and equitable way. It currently has 120 States parties, but in addition, the 11 International Agricultural Centres of the Consultative Group on International Agricultural Research (CGIAR) holding ex situ collections of Plant Genetic Resources for Food and Agriculture, as well as the Centro Agronómico Tropical de Investigación y Enseñanza and two of the four organizations hosting collections as part of the International Coconut Genetic Resources Network, have placed the collections they host under the framework of the Treaty, to be accessed according to the same rules.

22. The International Treaty on Plant Genetic Resources for Food and Agriculture seeks to establish a novel system of governance for global commons, ensuring permanent access to a large pool of genetic resources for the development of new and improved plant resources. Although the Treaty applies to all plant genetic resources for food and agriculture, its most original component — the Multilateral System of Access and Benefit-Sharing (MLS) — applies only to the plant genetic resources for food and agriculture listed in annex I to the Treaty that are under the

[8] See articles 27 and 62.1 of the TRIPS Agreement.

management and control of the States parties and in the public domain (article 11 (2)). This global pool comprises 64 food crops that make up more than 1 million samples of known plant genetic resources. The Multilateral System, which applies to these resources, is based on the idea that, while States have sovereign rights over their own plant genetic resources for food and agriculture, they agree to facilitate access to such plant genetic resources for the purpose of "utilization and conservation for research, breeding and training for food and agriculture" (article 12 (3) (a)), and to share, in a fair and equitable way, the benefits arising from the utilization of these resources.

23. Using the Standard Material Transfer Agreement, recipients may use the materials for food and agriculture for free, or for the minimal costs involved (article 15). If, incorporating such materials, they then commercialize a final product that is itself a plant genetic resource for food and agriculture and restrict others from using it for research and breeding, they must pay an equitable share of the benefits arising from the commercialization of that product, set by the Governing Body of the International Treaty at 1.1 per cent of the sales of the product (minus 30 per cent), or at 0.5 per cent of the sales over a 10-year period of commercialization of the same crop. These royalties are to be paid into a common fund created under the Treaty. The benefits arising from the MLS should flow primarily to farmers, especially in developing countries and countries with economies in transition, which conserve and sustainably utilize plant genetic resources for food and agriculture (article 13 (3)). Although these royalties shall only be paid to the fund in the next few years, it was announced at the third session of the Governing Body, convened in Tunis from 1 to 5 June 2009, that projects in 11 developing countries that conserve food seeds and other genetic material from major crops will receive US$ 50,000 each to support their efforts. This remains a very small sum in comparison to the needs.

III. Redirecting innovation towards the realization of the right to food

24. The renewed interest in agriculture since the global food crisis of 2007-2008 confronts Governments and the international community with important choices concerning the direction of future agricultural development. At least 1.5 billion individuals depend on small-scale farming for their livelihoods. Developing agriculture by ensuring that farmers, particularly small-scale farmers, have access to improved varieties of seeds has been a central component of a model of agricultural development sometimes called the "green revolution" model. Support to these farmers often takes the form of the provision of inputs, particularly seeds and fertilizers but including also pesticides, since one of the reasons why small-scale farmers are poor and cannot move beyond subsistence farming is because of the high prices of inputs and the lack of access to credit. But this form of support can create its own problems. First, although commercial seed varieties may improve yields in the short term, their higher performance often has been a response to inputs (fertilizers) and to water availability, making it difficult for farmers unable to access to such inputs and conditions to reap their benefits. Those who acquire inputs with their own means, often encouraged to do so during an initial period of subsidized inputs, may find themselves trapped in the vicious circle of debt as a result of a bad harvest and consequent impossibility to reimburse input loans. This may occur particularly when they have switched to monocropping leading to revenues which

may be higher in certain seasons but less stable across the years, and diminish resilience in the face of climate change. Second, commercial seed varieties may be less suited to the specific agroecological environments in which farmers work, and for which landraces (traditional farmers' varieties) may be more appropriate. Finally, the expansion of surfaces cultivated with commercial seeds accelerates crop diversity erosion, as an increasing number of farmers grow the same crops, using the same, "improved" varieties on their fields.

25. States therefore face two separate challenges. They must ensure that the commercial seed systems not only raise aggregate yields, but also that they work for the benefit of the farmers most in need to have their incomes raised — smallholders in developing countries. And they must support farmers' seed systems, on which not only these farmers depend, but the enhancement of which is vital, in addition, for our long-term food security.

A. Intellectual property rights in the commercial seed systems and the right to food

26. There are clear benefits to the development of new varieties of plants. Varieties that offer high yields when adequate conditions are present and when combined with appropriate inputs can limit the expansion of cultivated land and thus save virgin soils, which are a reservoir of biodiversity; certain varieties can have improved nutritional values, or specific disease resistance; and certain crops can be developed which are suitable for saline, dry or other marginalized soils. The granting of intellectual property rights in the form of patents or plant breeders' rights is primarily justified by the need to encourage such innovations, by allowing the patent-holder or the breeder to be rewarded for the investment made in the development of a new variety, following a model of commercial plant breeding typical of industrialized countries.

27. Yet, at the same time, a number of concerns are raised by the development of intellectual property rights over the past few years. It will lead to transfers of resources from technology users to technology producers, both within States and between States. The oligopolistic structure of the input providers' market may result in poor farmers being deprived of access to seeds productive resources essential for their livelihoods, and it could raise the price of food, thus making food less affordable for the poorest.[9] Three other concerns are more specific and deserve a separate comment.

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[9] See, in particular, *Tracking the trend towards market concentration: The case of the agricultural input industry*, United Nations Conference on Trade and Development secretariat, April 2006; ETC Group, *Who Owns Nature? Corporate Power and the Final Frontier in the Commodification of Life*, November 2008. According to the ETC Group, the top 10 seed companies account for 67 per cent of the global proprietary seed market; the world's largest seed company alone, Monsanto, accounts for 23 per cent of that market; and the top three companies (Monsanto, DuPont and Syngenta) account for 47 per cent of the market, including 65 per cent of the maize seed market and over half of the proprietary soybean seed market. It is this concentration, rather than the introduction of intellectual property rights alone, that may result in excessively high prices for agricultural inputs: see Lesser et al., "Intellectual Property Rights, Agriculture and the World Bank", in U. Lele et al. (eds.), *Intellectual Property Rights in Agriculture: The World Bank's Role in Assisting Borrower and Member Countries*, The World Bank, Washington, D.C., pp. 1-21, at 9.

1. The research exemption

28. Excessive protection of breeders' rights and patents may discourage innovation in the name of rewarding it. Applied research and crop improvement is a cumulative process, based on pre-existing plant material. Each incremental improvement that involves a new technology therefore faces the constraints of intellectual property and germ plasm which accumulate in the plant material. In jurisdictions such as the United States or the European Union where patents can be granted on life forms, there is a risk that further research will be impeded, rather than encouraged, as it would depend on the possibility to use patented material. The growing importance in recent years of patents on life forms, itself the result of the progress of biotechnology, may result in increasing restrictions to both farmers' and research exemptions, which plant variety protection (PVP) regimes generally include.

29. It is therefore welcome that a number of countries, including the Andean Pact countries, Brazil and Argentina, have chosen not to grant patents on plants. Although a number of countries not allowing patents on plants are parties to the 1991 UPOV Convention, this instrument should not be seen as an obstacle to establishing research exemptions in legislation protecting plant breeders' rights. It provides for exceptions for "acts done privately and for non-commercial purposes [and] for experimental purposes" (article 15 (1) (i) and (ii)); it allows national legislation that permits farmers "to use for propagating purposes, on their own holdings, the product of the harvest which they have obtained by planting, on their own holdings, the protected variety" (article 15 (2)); and it provides for the possibility of restricting breeders' rights for reasons of public interest (article 17 (1)).

30. But even those countries that chose to grant patents on plants may, consistent with article 30 of the TRIPS Agreement, introduce such an exemption, although the practice varies across countries. Members of WTO comply with TRIPS provided the exceptions imposed on patent-holders' rights remain limited; and provided patent-holders can still "extract economic value from their patent" and can "claim a 'legitimate interest' in the economic benefits".[10] A broad reading of the limitations which can be imposed on the definition of patent rights contained in article 28 of the TRIPS Agreement would be consistent with the intentions guiding the Agreement, as expressed in articles 7 and 8.

31. The granting of a research exemption may not be sufficient, however, since researchers face problems of delayed or blocked access to needed research tools because of a poor functioning of material transfer agreements.[11] Innovative techniques to overcome barriers to research on patented material may have to be developed further.[12] In situations where multiple patent-holders have patents in one variety, forming a "patent thicket", a patent pool could be formed, through which those patent-holders agree to license one or more of their patents as a package to one another, and to third parties (users) willing to pay the associated royalties: this is what was done, for example, for golden rice. Clearing houses could be set up, in order to facilitate the matching between users and patent-holders, particularly in situations of "patent thickets": a major example of this in the area of agricultural biotechnology is the Public Intellectual Property Resource for Agriculture (PIPRA),

[10] Canada — Pharmaceuticals (WT/DS114/R), paras. 7.56 and 7.61.

[11] Lei et al., "Patents versus Patenting: Implications of Intellectual Property Protection for Biological Research", *Nature Biotechnology*, 2009, pp. 36-40.

[12] The Special Rapporteur is indebted to Ms. G. Van Overwalle for the preparation of this section.

an alliance of more than 40 public institutions from more than 12 countries that seeks to decrease barriers created by intellectual property and to facilitate technology transfer by pooling their efforts to increase dissemination of innovations in staple and specialty crops, in particular by providing a one-stop intellectual property information clearing house for access to public sector patented technologies. Finally, research can be encouraged by developing open source experiments such as the Biological Open Source (BiOS) Licence pioneered in Canberra by the Centre for the Application of Molecular Biology to International Agriculture (CAMBIA), which puts the GUS and TransBacter technologies at the free disposal of researchers in agricultural biotechnology, without any condition other than to ensure that any improvements made to these enabling tools will be shared under the BiOS open source licence regime.

32. Where patents restrict research in ways which may have an impact on food security and are an obstacle to face situations of "national emergency" or other "extreme urgency", for instance in the face of declining crop productivity, article 31 of the TRIPS Agreement allows compulsory licensing.[13] Inspiration may be sought in this regard from the Patents and Plant Variety Rights (Compulsory Licensing) Regulations adopted in the United Kingdom of Great Britain and Northern Ireland in 2002, which allow applying for a licence to acquire or develop a new plant variety, which "constitutes significant technical progress of considerable economic interest in relation to the invention protected by the patent".[14] In addition, in line with the general purposes of the TRIPS Agreement, intellectual property rights may be restricted in the public interest, for instance through the doctrine of eminent domain.[15] And developed countries may make available to developing countries any biotechnologies developed through public research without the need for a licence or other permission.

33. In the short term, these tools may be appropriate, for instance, to limit the negative impacts of the recent trend towards patent claims made following the adaptation of specific gene traits that could confer one or more forms of stress tolerance linked to climate change (including salinity, drought or flood, heat or cold). In the long term, a procedure may have to be set up to allow the granting of non-exclusive licences to any requesting party for the use of any patented tool of biotechnology in order to ensure food security in developing countries.

2. The direction of research: "orphan crops"

34. The marked increase in intellectual property protection has led to a significant rise in patenting activity and in plant breeding.[16] But it also has created an imbalance between the private and the public sectors in agricultural research: for a number of reasons, public research centres are less able to benefit from the

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[13] On the possibilities of compulsory licensing and eminent domain doctrines to overcome the obstacles created by patents, see the contribution of Michael Blakeney to the experts' submission.

[14] These Regulations implement article 12 of Directive 98/44/EC of the European Parliament and of the Council of the European Union on the legal protection of biotechnological inventions (OJ L 213, 30.7.98, p. 13).

[15] Michael R. Taylor and Jerry Cayford, "Biotechnology Patents and African Food Security: Aligning America's Patent Policies and International Development Interests", *Harvard Journal of Law & Technology*, vol. 17, p. 323.

[16] See *UPOV, Report on the Impact of Plant Variety Protection*, 2005.

protection of intellectual property rights than private firms.[17] In turn, this has led to orientate research and development towards meeting the needs of farmers in rich countries, while the needs of poor farmers in developing countries have been comparatively neglected.[18] Very little research has benefited tropical maize, sorghum, millet, banana, cassava, groundnut, oilseed, potato or sweet potato, for example. These are referred to as "orphan crops": public research centres have not made up for the lack of interest of the private sector in these crops.

35. It is therefore vital either that the capacity of the public research centres and associated funding be increased, or that incentives be developed in order to reorient research and development in the private sector towards the real needs of poor farmers in developing countries. Participatory plant breeding, if sufficiently supported through domestic public policies, could partially compensate for the existing imbalance.

3. The impact of intellectual property rights on farmers' seed systems

36. The standard argument against the risk of increased dependency of smallholders towards commercial seed varieties is that farmers are not obliged to purchase plant variety protection (PVP)-protected seed just because it is made available. This, however, presupposes that farmers have real alternatives to acquiring their seed from the commercial system. Yet the coexistence between farmers' seed systems — operating at local or community levels between farmers, and mostly informal — and commercial seed systems is sometimes problematic.[19] Public authorities have supported the expansion of commercial seeds not only through plant variety protection schemes, but also through the use of input subsidies and via the diffusion of selected seeds in rural extension networks. Farmers often receive commercial varieties as part of a package that includes credit (often vouchers), seed, fertilizer and pesticide. In many cases, acceptance of such packages is the only way farmers can access credit in rural areas. They need to accept the whole package in order to do so. In addition, traditional varieties circulating farmers' seed systems — and on which the vast majority of farmers in developing countries still rely for most crops — are often excluded from government-approved seed lists that countries maintain under their seed regulations, and they are seldom included in seed distribution programmes subsidized by governments. The end result is a progressive marginalization or disappearance of local varieties.

37. Such a development may be consistent with a linear idea of progress favouring the replacement by high-yielding varieties of traditional crop varieties in the most productive areas. Yet it is a deeply problematic development even apart from the increased dependency of farmers it leads to. Farmers' seed systems may be particularly important to resource-poor farmers in resource-poor agroecological environments, because of the importance, for production in such environments, of

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[17] See United Nations Development Programme, *Human Development Report 2001: Making New Technologies Work for Human Development*, chapter 5, table 5.1.

[18] Only 6 per cent of privately funded agricultural research is focused on developing country agriculture: Nienke M. Beintema and Gert-Jan Stads, *Measuring Agricultural Research Investments: A Revised Global Picture*, 2008, available from http://www.asti.cgiar.org/pdf/global_revision.pdf.

[19] See C. J. M. Almekinders and Niels P. Louwaars, *Farmers' Seed Production. New Approaches and Practices*, London, Intermediate Technology Publications, 1999; Niels Louwaars, *Seeds of Confusion. The impact of policies on seed systems*, Ph.D., Wageningen Universiteit, 2007, p. 29.

locally adapted varieties. Production may not be discussed independently of distribution. Aiming to achieve food security simply by providing farmers with seeds that are high-yielding in certain conditions is premised on seeing food security as primarily a problem of production, when issues of accessibility are at least equally as important: the question which is omitted from this view is who will benefit from increased production, and the incomes of which groups will rise in comparison to those of other groups.

38. The spread of commercial varieties also raises the question of its impact on crop genetic diversity. For thousands of years, stability in the level of protection was achieved thanks to the coexistence of an array of plants, presenting different traits making them resistant to specific diseases, to drought, or to variations in temperature. This crop genetic diversity is now under severe threat. All efforts have been put into the development of a limited number of standard, high-yielding varieties, so that barely more than 150 species are now cultivated; most of mankind now lives off no more than 12 plant species, with the four biggest staple crops (wheat, rice, maize and potato) taking the lion's share.[20] It is estimated that about 75 per cent of plant genetic diversity has been lost as farmers worldwide have abandoned their local varieties for genetically uniform varieties that produce higher yields under certain conditions.[21] In addition, genetic diversity within crops is decreasing. In 1992-1993 for instance, 71 per cent of the commercial corn crop in the United States came from six varieties, 65 per cent of the rice from only four varieties, 75 per cent of the potato crop came from four varieties, 50 per cent of the soybeans crop from six varieties, and 50 per cent of the wheat from nine varieties. In Sri Lanka, 2,000 varieties of rice were cultivated in 1959; in 1992 they were fewer than 100, 75 per cent descending from a common stock. In Bangladesh and Indonesia, respectively, 62 and 74 per cent of the rice varieties descend from a common stock.[22] Such wide-scale genetic erosion increases our vulnerability to sudden changes in climate, and to the appearance of new pests and diseases.[23]

39. The expansion of intellectual property rights can constitute an obstacle to the adoption of policies that encourage the maintenance of agrobiodiversity and reliance on farmers' varieties. Intellectual property rights reward and encourage standardization and homogeneity, when what should be rewarded is agrobiodiversity, particularly in the face of the emerging threat of climate change and of the need, therefore, to build resilience by encouraging farmers to rely on a diversity of crops. In addition, intellectual property rights — particularly patents granted on plants or on genes or DNA sequences — can constitute a direct impediment to innovation by farmers. The preservation of agrodiversity and the development of farmers' seed

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[20] José Esquinas-Alcázar, "Protecting crop genetic diversity for food security: political, ethical and technical challenges", *Nature*, December 2005, vol. 6, pp. 946-953. See also Timothy Swanson, *Global Action for Biodiversity*, James & James Science Publishers, 2005 (originally published in Earthscan Publications, London, 1997), p. 52.

[21] D. Nierenberg and B. Halweil, *Cultivating Food Security*, New York, W. W. Norton & Co., 2005.

[22] World Conservation Monitoring Center, *Global Biodiversity: Status of the Earth's living resources*, London: Chapman and Hall, 1992; Stephen R. Gliessmann, *Agroecology: the ecology of sustainable food systems*, Technology & Engineering, 2006, p. 193.

[23] See Heal et al., "Genetic diversity and interdependent crop choices in agriculture", *Resource and Energy Economics*, vol. 26(2), June 2004, pp. 175-184. Genetic diversity is also important to food security for other reasons, less relevant in the context of this report. For an overview, see United Nations Environment Programme, *The Environmental Food Crisis: the Environment's Role in Averting Future Food Crises*, February 2009, pp. 65-76.

systems relies not only on the use of landraces (traditional, non-PVP-protected varieties) but also on the saving, exchange or sale of harvested seeds, since it is often the case that traditional varieties can be combined with modern varieties in order to produce varieties which perform better in specific local environments. However, although article 9 (3) of the International Treaty on Plant Genetic Resources for Food and Agriculture refers to the rights of farmers to save, use, exchange and sell farm-saved seed/propagating material, this right is only recognized "subject to national law and as appropriate", and restrictions to farmers' rights in order to better protect breeders' rights are common.

40. The strengthening of breeders' rights in the 1991 UPOV Convention is also a concern in this regard. This convention prohibits the commercialization of varieties which are essentially derived from a PVP-protected variety (article 14 (5)), and farmers are now prohibited from exchanging or selling seeds saved from the harvest of protected varieties (article 15). In order to circumvent these limitations, developing countries where the function of traditional, farmers' seed systems is most important both for the prevention of genetic erosion and for the livelihoods of farming communities should design sui generis forms of protection of plant varieties which allow these systems to flourish, even if this means adopting non-UPOV compliant legislation; and if they do join UPOV, they should use all the flexibilities available to them.

41. In identifying the system of intellectual property rights best suited to their specific needs, States could be supported by independent and participatory human rights impact assessments, in order to inform their choices.[24] But the use by States of the flexibilities they are allowed should not be discouraged either by international agreements or by private initiatives. No State should be forced to establish a regime for the protection of intellectual property rights which goes beyond the minimum requirements of the TRIPS Agreement: free trade agreements obliging countries to join the 1991 UPOV Convention or to adopt UPOV-compliant legislation, therefore, are questionable. Nor should the use of the existing flexibilities by States be nullified by private barriers. Indeed, even in the absence of strong intellectual property rights protections in certain jurisdictions or in addition to such protections, companies selling seeds may resort to contractual clauses (technology use agreements) or genetic use restriction technologies (GURTs) in genetically modified seeds, in order to protect their privilege. Although the reliance on GURTs has been halted owing to adverse publicity, the Special Rapporteur has received information according to which this de facto moratorium may be only temporary. These barriers should be prohibited in the domestic legislation on intellectual property rights.

B. Farmers' seed systems and the right to food

42. In South Asia and sub-Saharan Africa, the overwhelming majority of farmers still rely on traditional farmers' seed systems in order to grow their crops. Women play a key role in these systems: up to 90 per cent of planting material used in smallholder agriculture is seed and germ plasm produced, selected and saved by women, and it is predominantly women who grow and preserve underutilized

[24] See G. Dutfield, "Making TRIPS work for developing countries", in G. Sampson and W. B. Chambers (eds.), *Developing Countries and the WTO: Policy Approaches*, United Nations University Press, 2008.

species which local communities use to supplement their diets.[25] Reliance by farmers on farmers' seed systems allows them to limit the cost of production by preserving a certain degree of independence from the commercial seed sector. The system of unfettered exchange in farmers' seed systems ensures the free flow of genetic materials, thus contributing to the development of locally appropriate seeds and to the diversity of crops. In addition, these varieties are best suited to the difficult environments in which they live. They result in reasonably good yields without having to be combined with other inputs such as chemical fertilizers. And because they are not uniform, they may be more resilient to weather-related events or to attacks by pests or diseases. It is, therefore, in the interest of all, including professional plant breeders and seed companies which depend on the development of these plant resources for their own innovations, that these systems be supported.

1. Promoting and protecting farmers' rights

43. One means to restore an adequate balance between the rights of plant breeders and the needs of farmers is by strengthening the protection of farmers' rights under domestic and international law. The recognition of farmers' rights, as under article 9 of the International Treaty on Plant Genetic Resources for Food and Agriculture, is vital to the preservation of agrobiodiversity.[26] However, article 9 of the Treaty by itself will not suffice. These so-called farmers' "rights" remain rights without remedies: they are rights only by name. The provision remains vague, and implementation of this provision is highly uneven across the States parties. This is in sharp contrast with the enforcement, at international level, of plant breeders' rights and biotech-industry patents. Furthermore, there exists no forum in which the implementation of farmers' rights in various settings is discussed, in order to provide benchmarks and examples of good practices which Governments could seek inspiration from.

44. At the third session of the Governing Body of the International Treaty on Plant Genetic Resources for Food and Agriculture, held in Tunis in June 2009, steps were taken to encourage States to implement more fully article 9 of the Treaty. Merely removing barriers to the saving, exchange or selling of seeds will not suffice: for farmers' rights to be truly realized, Governments should accept that they have duties to support farmers' seed systems, as described below.

2. From direct and bilateral benefit-sharing to indirect and multilateral support for agrobiodiversity maintenance

45. The protection against the misappropriation of genetic resources should not result in new enclosures preventing access to genetic resources as a common heritage: the sharing of genetic resources not only promotes diversity, it also can contribute to food security by allowing research on new varieties to make progress, a process of sharing of, and improvement on, genetic resources in which farmers should be actively involved.

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[25] See Mata et al., "Integrating gender equality and equity in access and benefit-sharing governance through a rights-based approach", in Campese et al. (eds.), Rights-based approaches. *Exploring issues and opportunities for conservation*, Centre for International Forestry Research and International Union for Conservation of Nature and Natural Resources, 2009, pp. 251-268.

[26] See Regine Andersen, *Governing Agrobiodiversity: Plant Genetics and Developing Countries* (Aldershot, United Kingdom: Ashgate, 2008).

46. This is something that countries should take into account in their implementation of the Convention on Biological Diversity, keeping in mind that the Convention may not be appropriate for the management of plant genetic resources for food and agriculture — something which States recognized when they adopted the International Treaty, although crops not listed in annex I to the Treaty still remain within the framework of the Convention. But it is also relevant for the implementation of farmers' rights under the Treaty. Although article 9 (2) (b) of the Treaty concerns the right to participate equitably in the sharing of benefits arising from the utilization of plant genetic resources for food and agriculture, such benefits should not only accrue to those few farmers who happen to have plant varieties that are utilized by commercial breeding companies: in recognition of the fact that genetic resources constitute a common heritage which generations of farmers across the globe have contributed to, they should be shared with farmers in all countries engaged in the conservation and sustainable use of agrobiodiversity.

47. Such an approach has been followed by FAO since the adoption by the FAO Conference, on 29 November 1989 of resolution 5/89 on farmers' rights. It differs from the approach to benefit-sharing under the Convention on Biological Diversity, which is instead "bilateral and direct" in so far as "benefits are to be shared between purported 'owners' and buyers of the resources".[27] But benefit-sharing as conceived under the Convention has failed: in spite of the existence of a number of laws in developing countries which foresee forms of direct benefit-sharing between the "owners" and "buyers" of genetic resources, often upon prior informed consent on mutually agreed terms, as set out in the Convention, "so far there have been no examples of direct benefit-sharing between providers and recipients of plant genetic resources for food and agriculture resulting from such legislation".[27] In addition, since the demand for farmers' varieties among commercial breeders remains limited, so would the number of beneficiaries among farmers: the vast majority of farmers would remain uncompensated for their contribution to the maintenance and improvement of the common pool of genetic resources. And a system of direct benefit-sharing between "suppliers" owning the resources and "buyers" commercializing them could also be a disincentive to share seeds and propagate material among farmers.

3. Supporting farmers' varieties and associated knowledge

48. Rather than preventing access to traditional varieties and associated knowledge by creating a new system of enclosures, what is required is proactive support for their development. In order to encourage farmers who conserve and sustainably use plant genetic resources for food and agriculture, extension services could be provided to them specifically, and other incentives could be put in place, such as to facilitate the marketing of their produce or provide them easier access to credit. In the absence of proactive policies aimed at preserving and encouraging the development of farmers' seed systems and associated traditional knowledge and practices, such systems risk disappearing, as a result of three kinds of pressures. First, seed regulations (national seed certification schemes) may only catalogue commercial varieties which are PVP protected (since only these present the stability and uniformity required for cataloguing), and either explicitly exclude the trade of

[27] Information Paper on Farmers' Rights submitted by the Fridtjof Nansen Institute to the secretariat of the Plant Treaty, 20 May 2009, para. 2.2.

non-PVP-protected seeds or lead to de facto exclusion of traditional varieties, since the latter are normally not genetically homogeneous enough to meet the requirements for approval and certification. Second, government-sponsored programmes seeking to improve access to seeds may promote certain types of seeds only, such as hybrids, although they may often require to be combined with the use of expensive inputs, which may be unsustainable for cash-strapped farmers, and may not be best suited to local agronomic conditions. Third, the buyers of crops, particularly for the export sector, may require that their suppliers use certain seeds which guarantee uniformity and stability, at the expense of diversity and variability, leading to progressive genetic erosion.

49. A number of measures could be adopted by States in order to ensure that traditional knowledge is kept alive and can further develop among farmers. The reform of seed regulations is one possibility. Traditional varieties and associated knowledge could be documented in catalogues and gene banks, and farmers contributing to these banks could be compensated. In India, chapter VI of the 2001 Protection of Plant Varieties and Farmers' Rights Act points to this direction. In Senegal, peasant-farmers hold community registers of peasant varieties since 2003, so they can be circulated and disseminated more easily. International support for such programmes should be expanded in the future.

50. Local seed exchanges are an important component of seed supply and diffusion in regions where the seeds of traditional varieties are not available on the markets. Their development could be scaled up, by the support of community seed banks and seed fairs. Seed fairs bring together local farmers who have surplus seed of traditional food crops to sell or trade with other farmers looking for such seed. The poorest seedless farmers receive vouchers from the government, which can be exchanged for seed at the fair. This allows the farmers to select and buy their preferred seed varieties. Community seed banks pool the seed material from member farmers. Appropriate institutional arrangements should ensure the availability of planting material at the appropriate time as well as an adequate diversity of varieties. Such community seed banks exist in countries such as the Philippines or India and frequently emanate from grass-roots organizations. In Mali, some seed banks contain more than 350 samples of 70 different species.

51. These systems could be helped to prosper for a larger contribution to food security. Incentives for the use of food products that emanate from these systems in processing and marketing, or through public procurements schemes, are the next steps forward in maintaining and enhancing agrobiodiversity. They would bring much-needed additional incomes to vulnerable groups.

C. Bridging the systems

52. States face the distinct challenge of having to organize the coexistence between a commercial seeds system, which is growing in importance, and the farmers' seed systems, which must be supported and are a vital source of innovation from which all benefit. This challenge can be met by actively involving farmers in the design and implementation of seed policies, and by putting science at the service of farmers.

1. Participatory rights of farmers

53. The right to participate in decisions is an important human right, most explicitly mentioned in article 25 of the International Covenant on Civil and Political Rights (see also E/C.12/1999/5, in the context of the right to food). Among the elements of farmers' rights as defined in the International Treaty on Plant Genetic Resources for Food and Agriculture is "the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture" (article 9 (2) (c)). Farmers should be actively involved in the design of legislation covering the certification and trade of seeds or the conservation of plant genetic resources, as well as of plant variety protection laws and laws regarding patents. Combined with adequate capacity-building, this active participation should also be ensured for legislation or policies relating to the rest of agriculture (as opposed to the stewardship of plant genetic resources), since choices made in that area can significantly alter the structure of incentives for farmers who conserve genetic resources.

2. Putting science at the service of farmers

54. While a tension exists between the strengthening of intellectual property rights and farmers' rights, it is at the same time important to identify the considerable contributions that scientific research can make to improve the livelihoods of the most marginalized farmers. Participatory plant breeding, as for instance in Nepal, exemplifies the potential complementarities between the most advanced science and the needs of local communities. Participatory plant breeding intends to answer the needs of small farmers living in poor and marginal areas for which conventional breeding has offered few suitable varieties. In participatory plant breeding, farmers are treated as partners by researchers who work directly with them, often combining traditional seeds with modern varieties, and most of the testing takes place on the farm. This should ensure that the research undertaken is relevant to the farmers' needs and that, since local varieties are used, the varieties resulting from participatory plant breeding will be suited to the local environment. It also is empowering, particularly for poor rural women who often preserve the best seed for planting and therefore play a key role in managing plant genetic resources. Participatory plant breeding programmes already exist in the Syrian Arab Republic, Egypt, Eritrea, Mali, Nepal, Yemen, Nicaragua and Honduras.

55. Participatory plant breeding programmes can start in Farmer Field Schools, which aim to make farmers experts in their own fields. Originally introduced as part of the integrated pest management approach that emerged in the 1980s as a reaction to the environmental and social consequences of the green revolution model, Farmer Field Schools enable farmers to reduce their use of pesticides and rely instead on endogenous skills, knowledge and resources. Indeed, varieties are only one element in productive farming systems. Better soil management techniques, composting, water management, and agronomic practices may have an equal or greater impact upon productivity than the variety itself.

IV. Conclusions and recommendations

56. **States should promote innovation in both the commercial seed system and in farmers' seed systems, ensuring that innovation in both systems works for**

the benefit of the poorest and most marginalized farmers, particularly in the developing countries. Only by managing the coexistence of these systems can we hope to arrive at a system which adequately balances the needs for innovation, for the preservation and enhancement of crop diversity, and for improving the livelihoods of small-scale farmers in developing countries, who overwhelmingly still rely on seeds which they save from their own crops and which they donate, exchange or sell, often informally. The linear idea of progress favouring the replacement by high-yielding varieties of traditional crop varieties in the most productive areas embodies a vision of food security as primarily a problem of production. But, while ensuring adequate production levels will remain a challenge, particularly in the context of competing claims on land and of climate change, violations of the right to food stem today, for the most part, from lack of accessibility and insufficient incomes for the poorest, including smallholders. In addition, guaranteeing food security in the future requires that we protect crop genetic diversity, including agrobiodiversity. Our paradigm of agricultural development must therefore be redefined. This redefinition must be guided by the normative requirements of the right to adequate food.

57. In order to ensure that the development of the intellectual property rights regime and the implementation of seed policies at the national level are compatible with and conducive to the realization of the right to adequate food, the Special Rapporteur recommends that:

(a) All States should:

- Make swift progress towards the implementation of farmers' rights, as defined in article 9 of the International Treaty on Plant Genetic Resources for Food and Agriculture and consider expanding the list of crops subject to the Multilateral System of Access and Benefit-Sharing (MLS), contained in annex I to the Treaty, in order to encourage the shift from direct and bilateral benefit-sharing as envisaged in the Convention on Biological Diversity to indirect and multilateral support for agrobiodiversity enhancement. States not yet parties to the International Treaty should consider joining it;

- Consider using antitrust legislation in order to combat excessive concentration in the input providers' market, which entails the risk of abuse of dominant position by the seed companies concerned and the setting of prices at levels which may be unjustifiably high and unaffordable for poor farmers;

- In case they have not implemented the TRIPS Agreement yet, prepare right-to-food impact assessments prior to doing so, in order to ensure that the regime of intellectual property rights' protection which will be chosen will correspond to their development needs and will not result in depriving smallholders from access to their productive resources;

- Ensure that protection of patent-holders or plant breeders' rights does not discourage innovation in the name of rewarding it, by introducing barriers to the use of patented material. In particular, States should not allow patents on plants and should establish research exemptions in legislation protecting plant breeders' rights. If States do allow patents on

plants, they should establish research exemptions based on article 30 of the TRIPS Agreement;

- Ensure an efficient diffusion of improved commercial varieties which can truly benefit poor farmers through adequate information on the characteristics of such varieties;

- Seek to overcome the problems of delayed or blocked access to needed research tools and plant material, and encourage innovative mechanisms such as patent pools, clearing houses and open source experiments in order to overcome barriers to research on patented material, particularly where multiple patents exist on a single plant variety. States may wish to resort to compulsory licensing or the use of eminent domain doctrines where patents create obstacles to the development of varieties that can contribute to food security;

- Ensure that their seed regulations (seed certification schemes) and their programmes to support access to seeds do not lead to an exclusion of farmers' varieties. Instead, the development of such varieties should be encouraged by including efficient traditional seed varieties in government-approved seed lists as well as subsidized seed distribution programmes, as well as by participatory plant breeding and farmer field schools;

- Support and scale up local seed exchange systems such as community seed banks and seed fairs, and community registers of peasant varieties, and use them as a tool to improve the situation of the most vulnerable groups, i.e., through the granting to the poorest seedless farmers of seed vouchers which can be exchanged for seed at the fair. States should develop incentives for the wider use of food products made out of farmers' varieties in processing and marketing, or through public procurements schemes as in school-feeding programmes;

- Put in place mechanisms ensuring the active participation of farmers in decisions related to the conservation and sustainable use of plant genetic resources for food and agriculture, particularly in the design of legislation covering the certification and trade of seeds or the protection of plant varieties, so as to strike the right balance between the development of commercial and farmers' seed systems;

- Increase the resources allocated to public agricultural research and create new incentives for the private sector, in order to encourage research into the crops that benefit poor farmers in developing countries;

(b) Donors and international institutions, including the Consultative Group on International Agricultural Research and FAO, should assist States in implementing the above recommendations. They should, in particular:

- Support efforts by developing countries to establish a regime for the protection of intellectual property rights which suits their development needs and is based on human rights: (i) by refraining from imposing on these countries the condition that they go beyond the minimum requirements of the TRIPS Agreement, particularly by the insertion of "TRIPS-plus" provisions in free trade agreements; (ii) by encouraging the provision of technical advice to developing countries that facilitates the

adoption of sui generis systems for the protection of plant varieties, including by UPOV and WIPO, consistent with the status of WIPO as a specialized agency of the United Nations system and with its Development Agenda, which impose a duty on WIPO to mainstream human rights into its activities and to enhance the development dimension of its activities; and (iii) by prohibiting the use of contractual clauses (technology use agreements) or genetic use restriction technologies (GURTs) in genetically modified seeds by seed suppliers, whenever they rely on such clauses or technology in order to strengthen the protection of their privileges beyond the balance adopted by the legislator between the interest of suppliers and broader social goals;

- **Fund breeding projects on a large diversity of crops, including orphan crops, as well as on varieties for complex agroenvironments such as dry regions and not only in breadbasket regions, in order to address the needs of the most vulnerable groups;**

- **Put farmers at the centre of research through participatory research schemes such as participatory plant breeding;**

- **Channel an adequate proportion of funds towards research programmes and projects that aim at improving the whole agricultural system and not only the plant (agroforestry, better soil management techniques, composting, water management, good agronomic practices), as well as towards institutional innovations (such as community seed banks, seed fairs and farmer field schools).**